A UNIVERSAL INDEX GENERATOR
(UN GÉNÉRATEUR UNIVERSEL D'INDEX)

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ABSTRACT

Entities (persons, rock samples, documents, pieces of equipment, etc.,) can be described in terms of their attributes. The number and type of attributes chosen will depend upon the nature of the entity and on the specific context. For example, an author could be described by name,organization, department, position, phone number, street address, province, postal code, and interest in a file of contributors to the 1977 edition of the Canadian Journal of Information Science. Each attribute of each entity has a value which may or may not be unique. A set of values corresponding to the attributes given above is: Brandejs,Dr. J.F./Canadian Medical Association/Statistics,Systems, and Economic Research Unit/Director/(613)731-9331/P.O. Box 8650/Ottawa/Ontario/K1G 0G8/Communications Technology. The Universal Index Generator (UIG) demonstrated in this paper allows a non-computer-oriented user to build, list, modify, retrieve from, and generate extremely flexible indexes to a descriptor file of his own design and construction. Using UIG any descriptor may be permutted as an index term in the index. The description of an entity in this system is the total or partial set of its descriptors. The user controls not only what descriptors will appear in the index entry, but also the order in which they will appear.

A UNIVERSAL INDEX GENERATOR

Introduction

Many entities in our everyday lives have to be tagged and tucked away for future reference. Some of these entities may be print-media, some of them may be non-print media, some of them may not be media in the usual sense at all. What is required is a simple, economical, computer-assisted index generator which can provide a flexible, off-line locator for such entities. The Universal Index Generator (UIG) demonstrated in this paper is such a system.

Building a Descriptor File

Figure 1 shows the typical dialog in building a descriptor file using UIG. User generated entries are underlined. BLMRIG and UIG are used synonymously to refer to the system being demonstrated. The former acronym emphasizes the total functional capability of the system (Build, List, Maintain, Retrieve, and Index Generator); the latter acronym homes in on the key feature of the system, namely generating flexible indexes to give access to entities of any kind given one of their attributes.

```
YOU MAY NOW USE THE 'BLMRIG' SYSTEM TO:
   1. BUILD A DESCRIPTOR FILE
   2. LIST AN EXISTING DESCRIPTOR FILE
   3. MODIFY AN EXISTING DESCRIPTOR FILE
   4. RETRIEVE FROM AN EXISTING DESCRIPTOR FILE
   5. GENERATE AN INDEX TO AN EXISTING DESCRIPTOR FILE
   6. EXIT
INDICATE YOUR WISH BY ENTERING 1, 2, 3, 4, 5, OR 6.
 ?1
YOU WISH TO BUILD A DESCRIPTOR FILE, RIGHT? ANSWER 'Y' OR 'N'
 ?Y
ENTER DESCRIPTOR FILE NAME (5 CHAR. OR LESS) EG.:NAMES.
 ?CJIS
ENTER LENGTH OF LONGEST DESCRIPTOR IN CHARACTERS: 132 MAX.
 ?50
HOW MANY ATTRIBUTES WILL THERE BE FOR EACH ENTITY?
 ?10
```

```
ENTER THESE  10  ATTRIBUTES, ONE AT A TIME.
 ?NAME
 ?ORGANIZATION
 ?DEPARTMENT
 ?POSITION
 ?PHONE NUMBER
 ?STREET ADDRESS
 ?PLACE
 ?PROVINCE
 ?POSTAL CODE
 ?INTEREST
ENTER A VALUE FOR EACH ATTRIBUTE AS IT IS DIPLAYED.
NAME= ?"BRANDEJS, DR. J. F."
ORGANIZATION= ?CANADIAN MEDICAL ASSOCIATION
DEPARTMENT= ?"STATISTICS, SYSTEMS, AND ECONOMIC RESEARCH UNIT"
POSITION= ?DIRECTOR
PHONE NUMBER= ?(613)731-9331
STREET ADDRESS= ?P.O. BOX 8650
PLACE= ?OTTAWA
PROVINCE= ?ONTARIO
POSTAL CODE= ?K1G 0G8
INTEREST= ?COMMUNICATIONS TECHNOLOGY
RECORD  1  COMPLETE. IS THERE MORE? 'Y' OR 'N'.
 ?Y
NAME= ?"COLL, DR. DAVID C."
ORGANIZATION= ?CARLETON UNIVERSITY
DEPARTMENT= ?WIRED CITY LABORATORY
POSITION= ?PRINCIPAL IV\V\NVESTIGATOR
PHONE NUMBER= ?(613)231-3624
STREET ADDRESS= ?COLONEL BY DRIVE
PLACE= ?OTTAWA
PROVINCE= ?ONTARIO
POSTAL CODE= ?K1S 5B9
INTEREST= ?TELECONFERENCING
RECORD  2  COMPLETE. IS THERE MORE? 'Y' OR 'N'.
 ?Y
NAME= ?"DANIEL, DR. JOHN S."
ORGANIZATION= ?UNIVERSITE DU QUEBEC
DEPARTMENT= ?TELE-UNIVERSITE
POSITION= ?DIRECTEUR DES PROGRAMMES
PHONE NUMBER= ?(418)657-2496
STREET ADDRESS= ?2875 BOULEVARD LAURIER
PLACE= ?STE-FOY
PROVINCE= ?QUEBEC
POSTAL CODE= ?G1V 2M3
INTEREST= ?OPEN \ \-UNIVERSITY CONCEPT
RECORD  3  COMPLETE. IS THERE MORE? 'Y' OR 'N'.
 ?N
```

Figure 1 Building a Descriptor File

By entering a "1" we indicate to the system that we are interested in building a descriptor (attribute value) file. The system asks us to confirm our intent which we do by entering a "Y". Our descriptor file name is "CJIS" which stands for Canadian Journal of Information Science 1977 issue contributors. We do not expect our longest descriptor to exceed 50 characters. It is a good idea to be as conservative as possible when assigning this length since each descriptor will now take up a 50 character record. Experience shows that 30 characters is adequate for most descriptors. Each entity (contributors to the journal in this case) will be described in terms of the 10 attributes already listed in the abstract. These attributes are entered at this point. As soon as the last attribute is entered, the system requests values for each attribute for the first entity. When a value for each attribute has been entered, the system asks, "IS THERE MORE?". A response of "Y" causes the system to request values for the attributes of the next record and so on. A response of "N" upon completion of an entry terminates the file building process.

Listing a Descriptor File

Figure 2 shows how we can list the descriptor file, CJIS, which we have built. We simply enter "2", "Y" and "CJIS" after the appropriate prompts. The attributes of the CJIS file are listed followed by the contents of each logical record on that file.

```
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   3. MODIFY AN EXISTING DESCRIPTOR FILE
   4. RETRIEVE FROM AN EXISTING DESCRIPTOR FILE
   5. GENERATE AN INDEX TO AN EXISTING DESCRIPTOR FILE
   6. EXIT
INDICATE YOUR WISH BY ENTERING 1, 2, 3, 4, 5, OR 6.
 ?2
YOU WISH TO LIST AN EXISTING DESCRIPTOR FILE, RIGHT? 'Y' OR 'N'.
 ?Y
ENTER DESCRIPTOR FILE NAME.
 ?CJIS
```

```
THE ATTRIBUTES USED IN THE DESCRIPTOR FILE ARE:
 1 . NAME
 2 . ORGANIZATION
 3 . DEPARTMENT
 4 . POSITION
 5 . PHONE NUMBER
 6 . STREET ADDRESS
 7 . PLACE
 8 . PROVINCE
 9 . POSTAL CODE
 10 . INTEREST
RECORD  1
                BRANDEJS, DR. J. F.
                CANADIAN MEDICAL ASSOCIATION
                STATISTICS, SYSTEMS, AND ECONOMIC RESEARCH UNIT
                DIRECTOR
                (613)731-9331
                P.O. BOX 8650
                OTTAWA
                ONTARIO
                K1G 0G8
                COMMUNICATIONS TECHNOLOGY
RECORD  2
                COLL, DR. DAVID C.
                CARLETON UNIVERSITY
                WIRED CITY LABORATORY
                PRINCIPAL INVESTIGATOR
                (613)231-3624
                COLONEL BY DRIVE
                OTTAWA
                ONTARIO
                K1S 5B9
                TELECONFERENCING
RECORD  3
                DANIEL, DR. JOHN S.
                UNIVERSITE DU QUEBEC
                TELE-UNIVERSITE
                DIRECTEUR DES PROGRAMMES
                (418)657-2496
                2875 BOULEVARD LAURIER
                STE-FOY
                QUEBEC
                G1V 2M3
                OPEN-UNIVERSITY CONCEPT
```

Figure 2 Listing a Descriptor File

Modifying a Descriptor File

If the listing of a descriptor file reveals errors in the descriptors, it is a simple matter to correct them. Figure 3 demonstrates how a descriptor file can be modified.

```
YOU MAY NOW USE THE 'BLMRIG' SYSTEM TO:
   1. BUILD A DESCRIPTOR FILE
   2. LIST AN EXISTING DESCRIPTOR FILE
   3. MODIFY AN EXISTING DESCRIPTOR FILE
   4. RETRIEVE FROM AN EXISTING DESCRIPTOR FILE
   5. GENERATE AN INDEX TO AN EXISTING DESCRIPTOR FILE
   6. EXIT
INDICATE YOUR WISH BY ENTERING 1, 2, 3, 4, 5, OR 6.
 ?3
YOU WISH TO MODIFY AN EXISTING DESCRIPTOR FILE? 'Y' OR 'N'
 ?Y
ENTER DESCRIPTOR FILE NAME.
 ?CJIS
DO YOU WISH THE ATTRIBUTES LISTED? 'Y' OR 'N'.
 ?Y
 1 . NAME
 2 . ORGANIZATION
 3 . DEPARTMENT
 4 . POSITION
 5 . PHONE NUMBER
 6 . STREET ADDRESS
 7 . PLACE
 8 . PROVINCE
 9 . POSTAL CODE
 10 . INTEREST
ENTER # OF RECORD TO BE CHANGED.
 ?2
OLD RECORD  2 LOOKS LIKE THIS:
 1 . COLL, DR. DAVID C.
 2 . CARLETON UNIVERSITY
 3 . WIRED CITY LABORATORY
 4 . PRINCIPAL INVESTIGATOR
 5 . (613)231-3624
 6 . COLONEL BY DRIVE
 7 . OTTAWA
 8 . ONTARIO
 9 . K1S 5B9
 10 . TELECONFERENCING
```

```
ENTER # OF ATTRIBUTE VALUE TO BE CHANGED.
 ?3
OLD VALUE FOR ATTRIBUTE  3 : WIRED CITY LABORATORY
NEW VALUE FOR ATTRIBUTE  3 :  ?DEPT. OF SYSTEMS ENGINEERING
AND COMPUTING SCIENCE
CORRECTION MADE. ANY MORE CHANGES? 'Y' OR 'N'.
 ?Y
ENTER # OF RECORD TO BE CHANGED.
 ?2
OLD RECORD  2 LOOKS LIKE THIS:
 1 . COLL, DR. DAVID C.
 2 . CARLETON UNIVERSITY
 3 . DEPT. OF SYSTEMS ENGINEERING AND COMPUTING SCIENCE
 4 . PRINCIPAL INVESTIGATOR
 5 . (613)231-3624
 6 . COLONEL BY DRIVE
 7 . OTTAWA
 8 . ONTARIO
 9 . K1S 5B9
 10 . TELECONFERENCING
ENTER # OF ATTRIBUTE VALUE TO BE CHANGED.
 ?4
OLD VALUE FOR ATTRIBUTE  4 : PRINCIPAL INVESTIGATOR
NEW VALUE FOR ATTRIBUTE  4 :  ?CHAIRMAN
CORRECTION MADE. ANY MORE CHANGES? 'Y' OR 'N'.
 ?N
```

Figure 3 Modifying a Descriptor File

We indicate that we want to modify a file, confirm our intent and give the file name. We opt for an attribute listing. We enter the number of the record to be changed as given in the listing. We then enter the attribute number to be changed. The old value of this record/attribute combination is displayed and we are prompted by the system to enter its new value. Upon entering a new value, we are informed by the system that the correction has been made and asked if these are further changes. If we reply with a "Y", the process is repeated; if we enter "N", we exit from the modification module.

Retrieving from a Descriptor File

Since the UIG system is primarily intended as an index generator, the retrieved module is rudimentary. Figure 4 shows the procedure for a simple on-line retrieval.

```
YOU MAY NOW USE THE 'BLMRIG' SYSTEM TO:
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   3. MODIFY AN EXISTING DESCRIPTOR FILE
   4. RETRIEVE FROM AN EXISTING DESCRIPTOR FILE
   5. GENERATE AN INDEX TO AN EXISTING DESCRIPTOR FILE
   6. EXIT
INDICATE YOUR WISH BY ENTERING 1, 2, 3, 4, 5, OR 6.
 ?4
YOU WISH TO RETRIEVE FROM AN EXISTING DESCRIPTOR FILE? 'Y' OR 'N'.
 ?Y
ENTER DESCRIPTOR FILE NAME.
 ?CJIS
THE ATTRIBUTES USED IN THIS DESCRIPTOR FILE ARE:
 1 NAME
 2 ORGANIZATION
 3 DEPARTMENT
 4 POSITION
 5 PHONE NUMBER
 6 STREET ADDRESS
 7 PLACE
 8 PROVINCE
 9 POSTAL CODE
 10 INTEREST
ENTER THE # OF THE ATTRIBUTE SOUGHT.
 ?10
ENTER THE VALUE OF THE ATTRIBUTE SOUGHT.
 ?COMMUNICATIONS TECHNOLOGY
COMMUNICATIONS TECHNOLOGY FOUND IN RECORD  1
 1 BRANDEJS, DR. J. F.
 2 CANADIAN MEDICAL ASSOCIATION
 3 STATISTICS, SYSTEMS, AND ECONOMIC RESEARCH UNIT
 4 DIRECTOR
 5 (613)731-9331
 6 P.O. BOX 8650
 7 OTTAWA
 8 ONTARIO
 9 K1G 0G8
 10 COMMUNICATIONS TECHNOLOGY
DO YOU WISH TO SEARCH THROUGH THE REST OF THE FILE? 'Y' OR 'N'.
 ?Y
THIS SEARCH IS NOW COMPLETE.
```

Figure 4 Retrieving from a Descriptor File

As before we enter a module code, this time "4" to indicate retrieval, a "Y" and "CJIS". We are then given the attributes used in this descriptor file and asked to enter the code number of the attribute sought. In this case, it is "10" for "Interest". The value we want for this attribute is "COMMUNICATIONS TECHNOLOGY". We enter this, and the system locates a match in record 1. It displays this record in full and asks if it should look through the remainder of the file for another match. A "Y" will continue the search; a "N" will terminate it at the location of the current hit.

Index Generation from a Descriptor File

The chief feature of the UIG system is flexible index generation. As has been indicated above, any descriptor can be permutted as an index term. The description of an entity in this system can be the total set or a subset of the descriptors. The user controls not only what descriptors appear in the index entry, but also the order in which they appear. Figure 5 demonstrates this capability.

```
YOU MAY NOW USE THE 'BLMRIG' SYSTEM TO:
   1. BUILD A DESCRIPTOR FILE
   2. LIST AN EXISTING DESCRIPTOR FILE
   3. MODIFY AN EXISTING DESCRIPTOR FILE
   4. RETRIEVE FROM AN EXISTING DESCRIPTOR FILE
   5. GENERATE AN INDEX TO AN EXISTING DESCRIPTOR FILE
   6. EXIT
INDICATE YOUR WISH BY ENTERING 1, 2, 3, 4, 5, OR 6.
 ?5
YOU WISH TO GENERATE AN INDEX TO AN EXISTING DESCRIPTOR FILE? 'Y' OR 'N
 ?Y
ENTER DESCRIPTOR FILE NAME.
 ?CJIS
THE ATTRIBUTES USED IN THIS FILE ARE:
 1 NAME
 2 ORGANIZATION
 3 DEPARTMENT
 4 POSITION
 5 PHONE NUMBER
 6 STREET ADDRESS
 7 PLACE
 8 PROVINCE
 9 POSTAL CODE
 10 INTEREST
```

```
ENTER, ONE AT A TIME, THE # OF THE ATTRIBUTES YOU WISH TO BE PERMUTED IN
 THE INDEX. TYPE '99' TO END.
 ?10
 ?99
ENTER THE # OF THE ATTRIBUTES YOU WISH TO FORM THE DESCRIPTION IN THE OR
DER YOU WISH THEM TO APPEAR. '99' TO END.
 ?1
 ?5
 ?2
 ?7
 ?99
ENTER TITLE OF INDEX.
 ?CJIS CONTRIBUTI\I\ORS FOR 1977 EDITION
ENTER DATE: YR-MO-DA.
 ?77-01-15

                CJIS CONTRIBUTORS FOR 1977 EDITION (77-01-15)
                ---------------------------------------------

COMMUNICATIONS TECHNOLOGY    ♦BRANDEJS, DR. J. F.♦(613)731-9331♦CANADIAN
                             MEDICAL ASSOCIATION♦OTTAWA.
OPEN-UNIVERSITY CONCEPT      ♦DANIEL, DR. JOHN S.♦(418)657-2496♦UNIVERSIT
                             E DU QUEBEC♦STE-FOY.
TELECONFERENCING             ♦COLL, DR. DAVID C.♦(613)231-3624♦CARLETON U
                             NIVERSITY♦OTTAWA.
```

Figure 5 Index Generation from a Descriptor File

The preliminary responses for index generation follow the usual pattern: "5", "Y", and "CJIS". Again, the attributes used in this file as displayed with their respective code numbers. We then enter the code number(s) of the descriptor(s) which we wish to be permitted as indexing terms terminating the list with "99". Similarly, we enter the code number(s) of the descriptor(s) we wish to appear in the index entry, being careful to submit the code numbers in the order in which we wish the descriptors to appear in the index entry. In the example given, these code numbers are 1,5,2, and 7, terminated by a '99' code. Thus, the index entry should contain name, phone number, organization, and place. A look at the index will confirm that this is the content and sequence produced in the index entry.

Finally, the title of the index and the date of its generation are entered. The system then generates an index tailor-made to the requirements of a user of community of users.